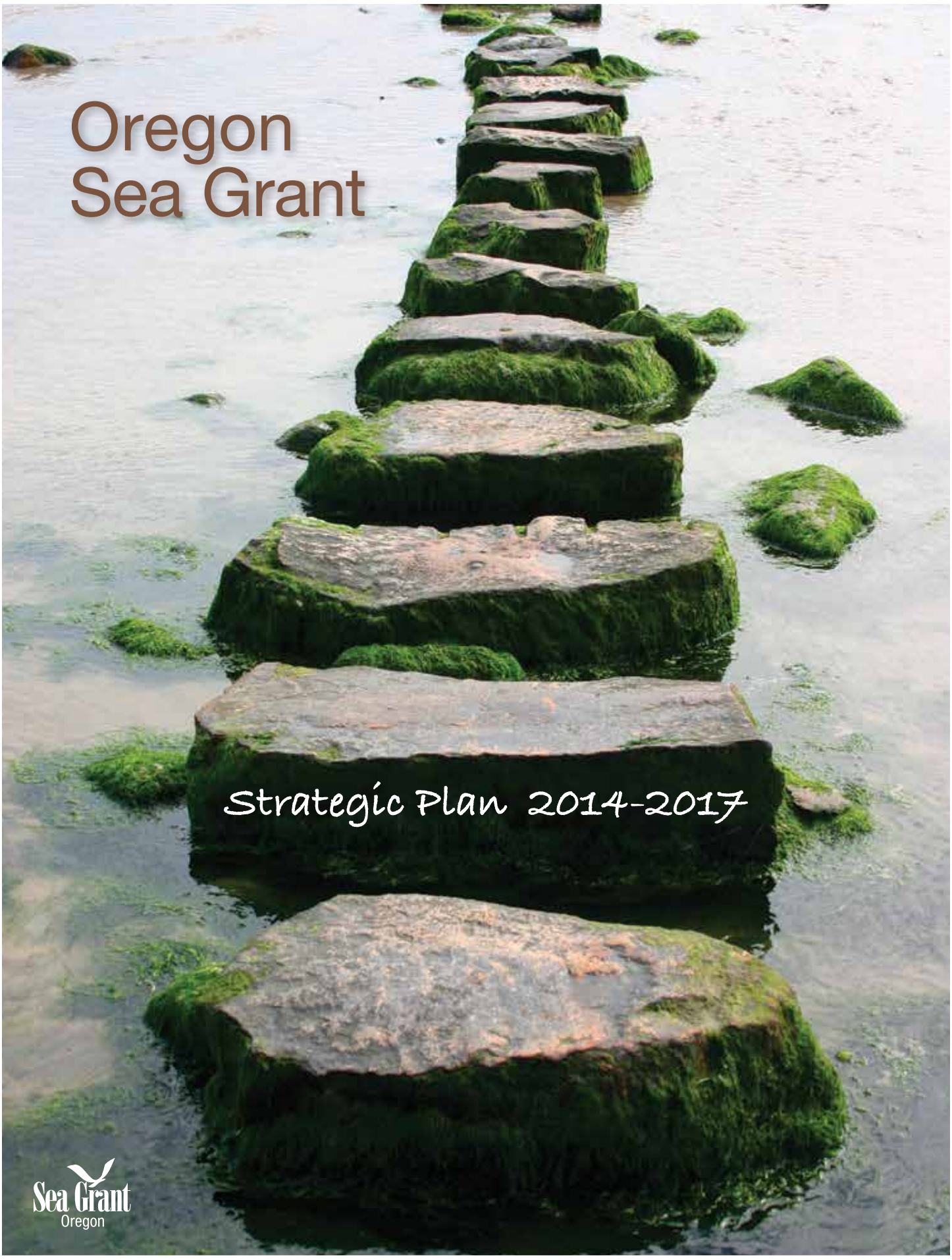
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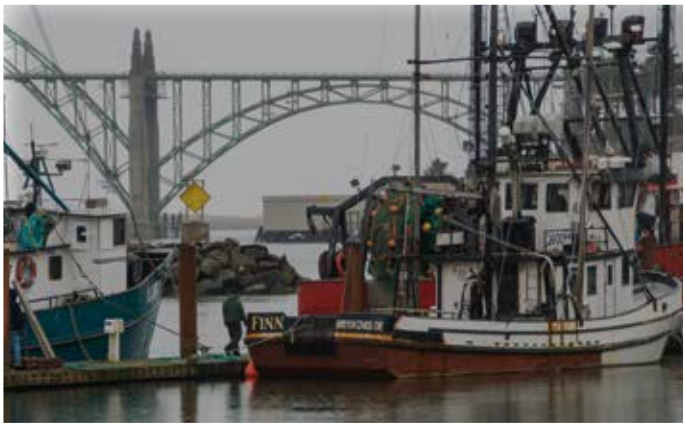


# Oregon Sea Grant

## Strategic Plan 2014-2017



Sea Grant Oregon

OSU Oregon State University

NOAA

# INTRODUCTION

## Oregon Sea Grant's Strategic Plan

for 2014–2017 identifies the program's goals and strategies for addressing key issues important to Oregonians, the region, and the nation. This plan also identifies the metrics we will use to track our progress toward these goals. The process of developing and publishing a strategic plan helps us focus and unify our thinking and communicate our priorities to our many partners and stakeholders. We look to this document to guide decision-making and resource allocations.

This strategic plan builds on our existing program strengths and allows us to be innovative as we address critical and emerging coastal and ocean issues. Our leadership and experienced faculty and staff will use this plan to apply their diverse skills toward improving the health and well-being of Oregon's people, economy, and environment.

## Oregon, a Coastal State

Oregon has more than 360 miles of coastline, bordered to the north by the Columbia River and to the south by California. The rich coastal and ocean resources of the region have provided the foundation for Oregon's diverse economies, communities, and coastal ecosystems. Oregonians share important aspirations for their health and well-being, social and economic vitality, and sustainable coastal ecosystems.

Although only about 225,000 of the state's nearly four million residents live in coastal counties, many Oregonians use, rely on, or benefit from our coastal region, which supports an almost $60 billion annual coastal and ocean economy driven by fisheries, agriculture, timber, tourism, and ocean industries. The state has pioneering land-use laws to conserve marine resources and ecological function for long-term benefits. In addition, the Oregon Beach Bill of 1967 guarantees public access to our beaches; there is an average of two public beach-access sites per mile of coastline.

Numerous rivers and streams drain nearly all water from Oregon's 15 major watersheds into the Pacific Ocean. There are 22 major estuaries along the Oregon coast, supporting a variety of species including salmon, rockfish, crabs, oysters, clams, shorebirds, and harbor seals. Rocky shores and islands make up many of the unique and picturesque landscapes of the Oregon coast. These biologically rich and visually dramatic shores have high value to Oregonians and visitors as places to recreate, relax, and learn.

In recent decades, ocean- and coastal-dependent communities have experienced substantial changes in their demographics and economies. Historically dependent on the timber, agriculture, and fishing industries, our small coastal and coastal-adjacent communities are in transition and looking to diversify by capitalizing on other strengths such as natural

beauty, clean air, temperate weather, authentic working waterfronts, and local culture. This variety of demands on coastal resources requires comprehensive management and planning to balance resource uses.

The Oregon coast is influenced by oceanic and atmospheric conditions and processes of the entire Pacific Ocean. Seasonal climatic variations, sea-level rise, storms, cyclical events such as the El Niño Southern Oscillation, the California Current, and geologic forces continually shape the coast and can exacerbate risk to coastal people, economies, and environment. Through these regional-scale factors we are naturally linked to our neighbor states of Washington and California, as well as Alaska and Hawaii.

The real strength of our organization lies in the talents and abilities of our people: individuals employed by the program, researchers funded by the program, and those contributing as partners and advisors.

## Oregon Sea Grant

Oregon Sea Grant is a statewide program headquartered at Oregon State University. Our mission is to develop and support an integrated program of research, outreach, and education that helps people understand, rationally use, and conserve marine and coastal resources.

Oregon Sea Grant was established in 1968 as one of the first three Sea Grants in the nation and in 1971 as one of four original Sea Grant College Programs under the National Oceanic and Atmospheric Administration (NOAA). It remains one of the largest and most productive of the 33 programs nationwide. We are a state-federal partnership, with the majority of federal support coming from NOAA. We also receive funding from Oregon State University, other state and federal appropriations and grants, contributions from counties and local governments, industry, and other sources.

Oregon Sea Grant is an integrated program of communication, education, extension, and research that engages partners and functions as a creator of knowledge, a convener of diverse stakeholders, and a trusted provider of information. The real strength of our organization lies in the talents and abilities of our people: individuals employed by the program, researchers funded by the program, and those contributing as partners and advisors. We have, or regularly access, expertise in the physical, biological, and social sciences. Our faculty and staff are located in coastal communities, at centers (such as the Hatfield Marine Science Center), and on the Oregon State University campus. Oregon Sea Grant's ability to integrate these diverse talents and abilities to address emerging issues has been critical to the continued success of our program.

Program activities within Oregon Sea Grant are equally wide-ranging. We provide professional, technical, and public education and learning opportunities through the Sea Grant Extension program—one of five program areas associated closely with Oregon State University Cooperative Extension. Much of the Extension engagement with stakeholders is enhanced with information products developed in concert with our professional communications staff. Oregon Sea Grant Communications not only provides material support (print, Web, video, etc.) to all elements of the program, but also collaborates on communications-related research.

Oregon Sea Grant's highly competitive grants program funds cutting-edge marine research in academic institutions throughout Oregon. The research addresses important issues and promises benefits to Oregonians. The program stresses scientific excellence and meaningful collaboration with industry, agencies, communities, and other stakeholders. A diverse citizen advisory council, including coastal community and business leaders, scientists, and resource managers, provides external review and advice to the program as a whole.

Sea Grant also manages the Visitor Center of the Hatfield Marine Science Center as a public science learning facility and free-choice learning laboratory. We work collaboratively to engage, listen to, inform, and assist a range of stakeholders, such as K–12 teachers and students, community and industry groups, conservationists, state resource managers, and the public. In addition, Sea Grant supports undergraduate and graduate students as "Sea Grant Scholars" to study important marine and coastal problems.

## Plan Development

The Oregon Sea Grant Strategic Plan was shaped by our faculty, staff, stakeholders, and advisory council. We began with a diverse strategic planning committee in a process that built on previous efforts and focused on integration across our communication, education, extension, and research administrative elements. The committee's initial concepts were refined during a meeting of staff and the OSG citizen Advisory Council. This meeting provided a venue for reflecting on past successes and challenges, as well as advancing concepts for new initiatives to address critical and emerging concerns. The resulting plan is aligned with the strategies outlined in the National Sea Grant 2014–2017 Strategic Plan, as well as the relevant goals of Oregon State University.


**A fundamental element of strategic planning and thinking** is framing the issues: what issues we work on, how we work on them, and what we expect to accomplish through our efforts. In a program with diverse expertise and interests, the challenge is to describe these issues in a way that clearly communicates our programmatic priorities, both within the organization and to interested parties outside of Oregon Sea Grant.

To this end, we have adopted the four focus areas identified in the National Sea Grant Strategic Plan:

- Healthy Coastal Ecosystems and Habitats
- Sustainable Fisheries and Aquaculture
- Resilient Communities and Economies
- Environmental Literacy and Workforce Development

These focus areas help to define our programmatic priorities. However, the focus areas are best understood as lenses through which to view our program, rather than as discrete categories. For example, our programming in aquatic invasive species can be viewed as affecting the health of coastal ecosystems, but it is equally valid to view this work through the lens of sustainable fisheries or improving environmental literacy.

Each focus area includes two or more strategic goals; there are a total of 11 goals across the four focus areas. Since our programming nearly always addresses more than one focus area, these 11 goals are often interdependent, and progress toward any one of them will inevitably address others.

Each strategic goal includes a series of outcomes. Outcomes are benchmarks for tracking progress toward strategic goals. There are three types of outcomes included in this plan—learning, action, and consequence—each of which is tracked by one or more of our 12 performance measures.

- Learning (short-term) outcomes lead to increased awareness, knowledge, skills, changes in attitudes, opinions, aspirations, or motivations through research and/or stakeholder engagement. In Oregon, such outcomes are achieved through a variety of techniques, including non-formal education (free-choice learning, Extension programming, adult education, workshops, print and electronic media, etc.) and more formal settings such as university courses, K–12 education, graduate education, peer-reviewed publications, and professional presentations.
- Action (medium-term) outcomes lead to behavior change, social action, adoption of information, improved decision-making, or changes in policies. Oregon examples include such actions as coastal communities adopting tsunami-evacuation plans, the development of a territorial sea plan, and middle-school teachers using native rather than invasive crayfish species in their classrooms.
- Consequence (long-term) outcomes may require focused efforts over multiple strategic planning cycles. Consequence outcomes in this four-year strategic plan serve as reference points toward reaching focus-area goals between the current and future strategic plans, rather than changes that will occur by 2017.

# Healthy Coastal Ecosystems and Habitats (HCE)

Oregon's coastal ecosystems (watershed, estuarine, shoreline, nearshore, and offshore) are among the most productive in the world, yielding a bounty of benefits such as fisheries, tourism, alternative energy sources, clean water, and habitat for people and other species, such as gray whales. These ecosystems, including their human elements, face increasing challenges from natural and societal stressors such as erosion, habitat modifications, aquatic invasive species, hypoxia, contaminants, over-use, and climate change. These stressors can put excessive strain on coastal ecosystem functioning and ecosystem services, and reduce our ability to sustainably use and benefit from all that our coast has to offer.

Keeping coastal ecosystems healthy is a challenge because the diverse stressors do not adhere to traditional political boundaries. Responsible management of these systems requires new kinds of thinking and actions, often termed ecosystem-based management. Ecosystem-based approaches require coordination among federal, state, and local jurisdictions, and the active engagement of the people who live, work, play, and develop policies along our coasts. They also require understanding of the characteristics of species, landscapes, and their interactions within each ecosystem.

Oregon Sea Grant integrates efforts across program resources and expertise and with partners (state and federal agencies, nonprofit organizations, stakeholders, etc.) to address ecosystem-scale issues. We will continue to pursue and strengthen current programming such as working waterfronts, aquatic invasive species, coastal hazards, habitat restoration, wave energy, watershed education, and coastal tourism. We will also explore opportunities to enhance our activities around contaminants of emerging concern in surface- and groundwater as well as human dimensions research, including issues surrounding marine spatial planning and "peopled seascapes."

Three strategic goals are associated with the HCE focus area:

## Goal 1:

Ecosystem services are improved by enhanced health, diversity, and abundance of fish, wildlife, and plants.

### LEARNING OUTCOMES

**1.1.** Oregon researchers and educators use the best available science to develop, or adopt, and calibrate new standards, measures, and indicators of ecosystem sustainability.

**1.2.** Oregon researchers and educators identify critical uncertainties that impede progress toward achieving sustainability of Oregon's coastal ecosystems and the goods and services they provide.

### ACTION OUTCOMES

**1.3.** Oregon resource managers, policy- and decision-makers use results from the best available science to support ecosystem-based management.

### CONSEQUENCE OUTCOMES

**1.4.** Coastal ecosystems provide a wide range of ecological, economic, and societal services, and are more resilient to disturbance.

**1.5.** Greater public stewardship leads to participatory decision-making and collaborative, ecosystem-based management decisions by Oregon communities, agencies, and stakeholders.

## Goal 2:

Ecosystem-based approaches are used to manage land, water, and living resources.

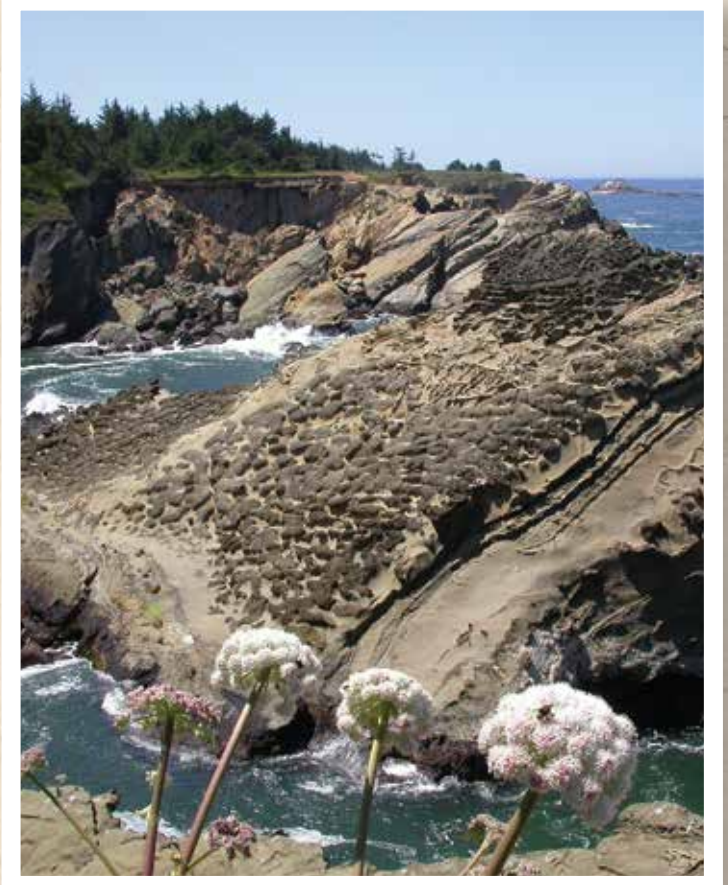
### LEARNING OUTCOMES

**2.1.** Oregon stakeholders access data, models, policy information, and training that support ecosystem-based planning, decision-making, and management approaches.

**2.2.** Baseline data, standards, methodologies, and indicators are developed or used to assess the health of Oregon's coastal ecosystems and watersheds.

**2.3.** Based on the best available science, coastal residents, resource managers, businesses, and industries understand the effects of human activities and environmental changes along the Oregon coast.

**2.4.** Resource managers in Oregon communities and agencies have an understanding of the issues that impact coastal protected species.



### ACTION OUTCOMES

**2.5.** Methodologies are used to evaluate a range of practical ecosystem-based management approaches for planning, and adapt to future management needs along Oregon's coast.

**2.6.** Resource managers in Oregon communities and agencies apply ecosystem-based management principles when making decisions.

**2.7.** Resource managers in Oregon communities and agencies incorporate laws and policies to facilitate and implement ecosystem-based management.

**2.8.** Residents, resource managers, and businesses integrate social, natural, and physical sciences when managing Oregon's coastal resources, and work with all sectors in the decision-making process.

### CONSEQUENCE OUTCOMES

**2.9.** Oregon's land, water, and living resources are managed using ecosystem-based approaches.

## Goal 3:

Ecosystems and their habitats are protected, enhanced, or restored.

### LEARNING OUTCOMES

**3.1.** Oregon residents, resource managers, and businesses understand the importance of the benefits provided by preserving non-degraded ecosystems.

**3.2.** Oregon residents, resource managers, and businesses understand the science behind the threats to ecosystems and the consequences of degraded ecosystems.

### ACTION OUTCOMES

**3.3.** Scientists develop technologies and approaches to restore degraded ecosystems along Oregon's coast and in contributing watersheds.

**3.4.** Resource managers set realistic and prioritized goals and policies to protect, enhance, and restore habitats along Oregon's coast and in contributing watersheds by incorporating scientific information and public input.

**3.5.** Resource managers, businesses, and residents adopt innovative approaches and technologies to maintain or improve the function of ecosystems along Oregon's coast and in contributing watersheds.

### CONSEQUENCE OUTCOMES

**3.6.** Oregon natural habitats are protected, enhanced, or restored.

**3.7.** Degraded ecosystem function and productivity are restored in Oregon's coastal and contributing watersheds.

# Sustainable Fisheries and Aquaculture (SFA)

Oregon's coastal history, culture, and economy are shaped in part by our productive fisheries. Oregon Sea Grant's various program elements access the experiential knowledge of the fishing community to enhance understanding and science-informed management of sustainable, commercially valuable fish stocks and the ecosystems that support them. Integrated programming examines relationships between habitat, physical forces (e.g., climate change, currents), food webs (including invasive species and disease), and fish production.

Oregon Sea Grant plays a critical role in building partnerships and helping businesses and communities self-organize, thereby increasing the efficacy of citizen engagement in fisheries-related decision-making and management. We will continue our work that builds capacity within communities of place and of practice, as well as with the coastal groups we have helped to coordinate and facilitate. We will continue in our efforts to enhance local access to, and markets for, seafood, and support improvements in fishing techniques.

We also work to maximize locally realized benefits of Oregon seafood by enhancing seafood product development, food safety and handling, and other programs that advance consumer awareness and ability to make healthy choices related to seafood consumption. We will continue programs that enhance seafood processing capacity with local companies and consumers, and look for opportunities to expand programming with international consumers as well as with currently underserved audiences, such as Native American tribes.

We will continue our work in aquaculture, particularly related to shellfish and ornamental fish. The shellfish industry faces a number of important challenges, including seasonal hypoxia in upwelled marine waters, diseases such as *Vibrio tubiashii,* aquatic invasive species, and ocean acidification. The challenges facing the ornamental fish industry include highly variable quality and health of fish imported into Oregon from overseas, risk of aquatic invasive species introductions associated with some of these imports, and a risk of introduced aquatic animal diseases. We will seek out opportunities to expand our programming outside the U.S.

Two strategic goals are associated with the SFA focus area:

## Goal 4:

A safe, secure, and sustainable supply of seafood to meet public demand.

### LEARNING OUTCOMES

**4.1.** Fishery managers and fishermen understand the state of the science related to the dynamics of wild fish populations.

**4.2.** The Oregon seafood industry gains knowledge about innovative seafood technologies, approaches, and policies.

**4.3.** Commercial and recreational fishermen in Oregon are knowledgeable about efficient and responsible fishing techniques.

**4.4.** The commercial fishing industry is aware of innovative marketing strategies to add value to Oregon's products.

**4.5.** Oregon seafood producers learn economically viable techniques and processes to ensure the production and delivery of safe and healthy seafood.

### ACTION OUTCOMES

**4.6.** Oregon fishermen employ innovative technologies and techniques that reduce negative impacts on depleted, threatened, or endangered species.

**4.7.** The Oregon seafood industry adopts new production technologies to supply safe and sustainable seafood, and adopts marketing strategies to add value to its products.

**4.8.** The Oregon seafood industry adopts techniques and approaches to minimize the environmental impact of its sectors.

**4.9.** Oregon resource managers establish policies and regulations that achieve a better balance between economic benefit and conservation goals.

### CONSEQUENCE OUTCOMES

**4.10.** Oregon seafood is sustainably managed and safely produced.

**4.11.** Oregon expands its sustainable domestic fishing and aquaculture industries.


*Oregon Sea Grant plays a critical role in building partnerships and helping businesses and communities self-organize, thereby increasing the efficacy of citizen engagement in fisheries-related decision-making and management.*

## Goal 5:

Informed consumers who understand the health benefits of seafood consumption and how to evaluate the safety and sustainability of the seafood they buy.

### LEARNING OUTCOMES

**5.1.** The Oregon seafood industry knows about the best science for safe seafood handling and production.

**5.2.** Oregon seafood consumers have the knowledge to evaluate sustainable seafood choices.

**5.3.** Oregon seafood consumers have an increased knowledge of the nutritional benefits of seafood products and know how to judge seafood safety and quality.

### ACTION OUTCOMES

**5.4.** The Oregon seafood industry adopts standards for safe seafood.

**5.5.** The Oregon seafood industry adopts technologies and techniques to ensure seafood safety.

**5.6.** Oregon seafood consumers preferentially purchase sustainable seafood products.

### CONSEQUENCE OUTCOMES

**5.7.** Consumers improve their health through increased consumption of safe and sustainable seafood products produced in Oregon.

**5.8.** The Oregon seafood industry operates sustainably and is economically viable.


# Resilient Communities and Economies (RCE)

**Oregon's coastal communities** provide vital economic, social, and recreational opportunities for residents and visitors. A changing climate and concerns about locally generated tsunamis have increased awareness of the vulnerability of coastal communities and ecosystems. Balancing the varied demands on coastal resources requires Oregon to develop innovative policies, institutional capacities, and management approaches to increase community resilience.

Oregon Sea Grant will bring its unique research and engagement capabilities to support the development of resilient coastal communities that sustain diverse and vibrant economies, effectively respond to and mitigate natural and technological hazards, and function within the limits of their ecosystems. We will continue and strengthen our programming around climate-change issues with stakeholders and local communities. We will explore possibilities for expanding our programming in diverse concerns associated with climate change, including sea-level rise, water quantity and quality, impacts on native and invasive species, ocean acidification, and hypoxia.

Coastal communities in Oregon are increasingly aware of their vulnerability to distant events, such as the tsunami created by the earthquake near the coast of Japan in 2011, and to nearshore events such as the historical shifting of the Cascadia Subduction Zone and resulting tsunamis along the coast. We will continue to support research related to tsunamis and our programming informing residents and stakeholders of the risks and proper responses to near and distant events. We will explore opportunities to expand this work along the entire Oregon coast, including working with local businesses to conduct trainings and distribute information for tourists.

Marine economies in coastal communities are heavily dependent on recreational and commercial fishing, and tourism. We will continue our work to engage local communities and the fishing industry on issues such as ocean use and sustainable practices. We will continue to support research that is relevant to Oregon stakeholders, and look for opportunities to enhance our programming and partnerships around coastal tourism.

Four strategic goals are associated with the RCE focus area:

## Goal 6:

### Development of vibrant and resilient coastal economies.

#### LEARNING OUTCOMES

**6.1.** Oregon coastal communities know about the important linkages between economic health and the health of natural and cultural systems.

**6.2.** Oregon coastal communities have access to information needed to understand the value of waterfront- and tourism-related economic activities.

**6.3.** Oregon coastal communities understand the strengths and weaknesses of alternative development scenarios on resource consumption and local economies.

**6.4.** Oregon coastal communities are aware of the link between environmental regulations and economic sustainability.

### ACTION OUTCOMES

**6.5.** Oregon citizens are actively engaged in decisions about management and regulations that affect their local economies.

**6.6.** Oregon communities engage in economic development initiatives that capitalize on the value of their natural and cultural resources while balancing resource conservation and economic growth.

### CONSEQUENCE OUTCOMES

**6.7.** Working waterfronts in Oregon communities are part of a diverse and healthy economy.

**6.8.** Oregon communities are economically viable and supported by healthy ecosystems.

## Goal 7:

Communities use comprehensive planning to make informed strategic decisions.

### LEARNING OUTCOMES

**7.1.** Coastal Oregon communities understand the connection between planning and natural-resource management issues, and understand how management decisions may reduce conflicts, improve resource conservation efforts, and increase community resilience to environmental and economic stressors.

### ACTION OUTCOMES

**7.2.** Coastal communities in Oregon make use of tools and information to explore alternatives in coastal development, including community visioning exercises, resource inventories, and coastal planning.

**7.3.** Oregon coastal communities adopt plans that address both resource conservation and economic viability.

**7.4.** Oregon citizens, leaders, and businesses work together to implement plans for the future and to balance multiple uses of coastal areas.

### CONSEQUENCE OUTCOMES

**7.5.** Quality of life in Oregon coastal communities, as measured by economic and social well-being, improves without adversely affecting environmental conditions.

## Goal 8:

Improvements in coastal water resources sustain human health and ecosystem services.

### LEARNING OUTCOMES

**8.1.** Oregon communities are educated about the impact of human activities on water quality and quantity.

*Oregon Sea Grant will bring its unique research and engagement capabilities to support the development of resilient coastal communities that sustain diverse and vibrant economies, effectively respond to and mitigate natural and technological hazards, and function within the limits of their ecosystems.*

**8.2.** Oregon coastal communities understand the value of clean water, adequate supplies, and healthy watersheds.

**8.3.** Oregon coastal communities understand the rationale behind water laws and policies affecting the use and allocation of water resources.

#### ACTION OUTCOMES

**8.4.** Oregon coastal communities engage in planning efforts to protect water supplies and improve water quality.

**8.5.** Oregon coastal communities adopt mitigation measures, best management practices, and improved site designs in local policies and ordinances to address water supplies and water quality for all living resources.

#### CONSEQUENCE OUTCOMES

**8.6.** Water supplies in Oregon communities are sustained.

**8.7.** Water quality in Oregon is protected and improved.

## Goal 9:

Resilient coastal communities adapt to the impacts of hazards and climate change.

#### LEARNING OUTCOMES

**9.1.** Residents and decision-makers in coastal Oregon communities are aware of and understand the processes that produce hazards and climate change and the implications of those processes for them and their communities.

**9.2.** Decision-makers along the Oregon coast are aware of hazard- and climate-related data and resources and have access to information and skills to assess local risk vulnerability.

**9.3.** Oregon coastal communities have access to data, adaptive tools, and techniques to mitigate the potential negative impact from hazards.

**9.4.** Decision-makers in Oregon understand the legal and regulatory regimes affecting adaptation to climate change, including coastal and riparian property rights, disaster relief, and insurance issues.

#### ACTION OUTCOMES

**9.5.** Oregon coastal communities apply best available hazards and climate-change information, tools, and technologies in the process of planning for resilience.

**9.6.** Decision-makers in Oregon apply data, guidance, policies, and regulations to hazard-resilience planning.

**9.7.** Oregon coastal communities develop and adopt hazard-mitigation and -adaptation strategies suited to local needs.

**9.8.** Oregon coastal residents take action to reduce the impact of coastal hazards on their life and property.

**9.9.** Oregon coastal communities adopt a communications strategy for hazardous events.

#### CONSEQUENCE OUTCOMES

**9.10.** Oregon coastal communities effectively prepare for hazardous events and climate change.

**9.11.** Oregon coastal communities are resilient and experience minimum disruption to life and economy following hazard events.

# Environmental Literacy and Workforce Development (EWD)

**Environmental literacy** is a fundamental understanding of natural systems: the relationships and interactions between the living and non-living environment. But literacy goes beyond simply knowing and understanding, to acting—whether through seeking out new learning or changing behavior. Promoting sustained, long-term environmental literacy in the 21st century requires rethinking how we engage professional and public audiences. New models for Sea Grant Extension and education based in research on how learners deploy choice and control across different work, school, and leisure contexts can help Oregon Sea Grant better serve existing audiences while reaching new and underserved audiences where and when they need it.

Since 2003, Oregon Sea Grant has led the way at Oregon State University and within the national Sea Grant network in bringing current research on free-choice learning across the lifespan to environmental literacy and workforce development efforts for both schools and public audiences. In 2012, the Oregon Sea Grant Education Program adopted a new name and strategic focus on free-choice learning. All of our education programming now fall under the umbrella of Free-Choice Learning. Free-choice learning is a way of describing the learning that happens when choice and control in learning shifts from educators to learners. Such self-directed learning is typical of most of the learning that occurs across the lifespan. Indeed, nearly all our current educational activities are free-choice learning experiences for participants.

We will also continue other efforts supporting environmental literacy and workforce development, to be supported by our expertise in science communications. We will continue to provide fellowship and scholarship opportunities for students at all Oregon academic institutions, and will explore opportunities to expand environmental literacy activities.

Two strategic goals are associated with the EWD focus area:

## Goal 10:

An environmentally literate public supported and informed by a continuum of lifelong formal and informal engagement opportunities.

### LEARNING OUTCOMES

**10.1.** Formal and informal educators are knowledgeable of the best available science on the effectiveness of free-choice learning in informal environments.

**10.2.** Formal and informal educators understand environmental literacy principles.

**10.3.** Lifelong learners in Oregon are able to engage in informal science education opportunities focused on coastal topics.

### ACTION OUTCOMES

**10.4.** Outreach and engagement professionals use environmental literacy principles in their programs.

*Promoting sustained, long-term environmental literacy in the 21st century requires rethinking how we engage professional and public audiences.*

**10.5.** Extension and free-choice learning programs are developed and refined using the best available research on the effectiveness of environmental and science education.

**10.6.** Formal and informal education programs incorporate environmental literacy components.

**10.7.** Formal and informal education programs take advantage of the knowledge of Sea Grant-supported scientists and engagement professionals.

**10.8.** Formal and informal educators, students, and/or the public collect and use coastal data in inquiry- and evidence-based activities.

**10.9.** Lifelong learners make choices and decisions based on information they learned through informal science-education opportunities.

**10.10.** Educators work cooperatively to leverage federal, state, and local investments in coastal environmental education.

#### CONSEQUENCE OUTCOMES

**10.11.** Oregon residents incorporate broad understandings of their actions on the environment into personal decisions.

## Goal 11:

A future workforce reflecting the diversity of Sea Grant programs, skilled in science, technology, engineering, mathematics, and other disciplines critical to local, regional, and national needs.

#### LEARNING OUTCOMES

**11.1.** Students and teachers in Oregon schools and universities are aware of opportunities to participate in science, technology, engineering, mathematics, and active stewardship programs at all levels.

#### ACTION OUTCOMES

**11.2.** Oregon Sea Grant research projects support undergraduate and graduate training in fields related to understanding and managing our coastal resources.

**11.3.** Graduate students at Oregon colleges and universities are trained in research and engagement methodologies.

**11.4.** Participants in Oregon Sea Grant programs become a more diverse and qualified pool of applicants that pursue professional development opportunities in natural, physical, and social sciences and engineering.

#### CONSEQUENCE OUTCOMES

**11.5.** Oregon institutions produce a diverse workforce that is trained in science, technology, engineering, mathematics, communication, management, and policy or other job-related fields, and that has high job satisfaction.

# PERFORMANCE MEASURES

**Performance measures** are the metrics by which OSG will track progress toward implementation of the Strategic Plan. We have adopted 12 performance measures from the National Sea Grant Strategic Plan. Our diverse program elements and expertise contribute in unique but variable ways to each performance measure. For example, our programming around coastal hazards will generate a different suite of metrics than programming in marine science education or aquaculture.

Each of these performance measures is informed by input from our faculty and staff as well as our recent history of reporting such metrics.

**1.** Number of Sea Grant tools, technologies, and information services that are used by our partners/customers to improve ecosystem-based management.

**2.** Number of ecosystem-based approaches used to manage land, water, and living resources in coastal areas as a result of Sea Grant activities.

**3.** Number of acres of coastal habitat protected, enhanced, or restored as a result of Sea Grant activities.

**4.** Number of fishermen, seafood processors, and aquaculture industry personnel who modify their practices using knowledge gained in fisheries sustainability and seafood safety as a result of Sea Grant activities.

**5.** Number of seafood consumers who modify their purchases using knowledge gained in fisheries sustainability, seafood safety, and the health benefits of seafood as a result of Sea Grant activities.

**6.** Number of communities that implemented sustainable economic and environmental development practices and policies (e.g., land-use planning, working waterfronts, energy efficiency, climate-change planning, smart growth measures, green infrastructure) as a result of Sea Grant activities.

**7.** Number of communities that implemented hazard resiliency practices to prepare for, respond to, or minimize coastal hazardous events as a result of Sea Grant activities.

**8.** Number of Sea Grant-facilitated curricula adopted by formal and informal educators.

**9.** Participation in Sea Grant-supported informal education programs.

**10.** Number of Sea Grant-supported graduates who become employed in a career related to their degree within two years of graduation.

**11.** Economic benefits.

- **a.** Market and non-market benefits from Sea Grant activities.
- **b.** Businesses created as a result of Sea Grant activities.
- **c.** Businesses retained as a result of Sea Grant activities.
- **d.** Jobs created as a result of Sea Grant activities.
- **e.** Jobs retained as a result of Sea Grant activities.
- **f.** Patents derived from Sea Grant activities.

**12.** Number of peer-reviewed publications produced by the Sea Grant network, and number of times each peer-reviewed publication has been cited in the past four years.

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